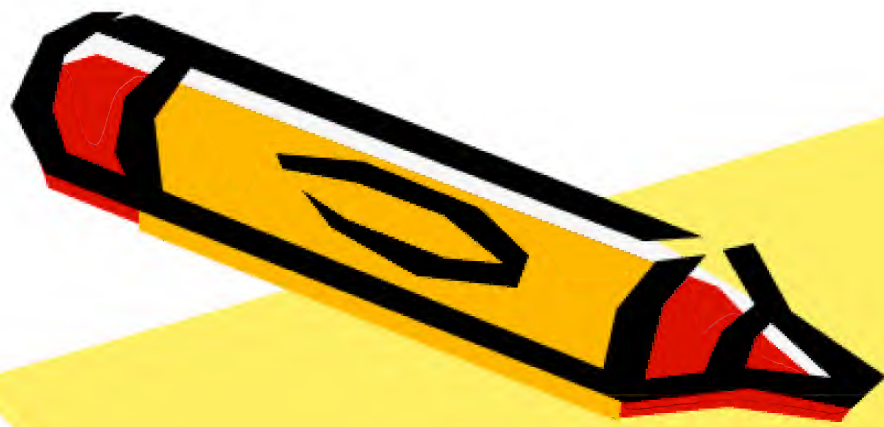


بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ





Containment of Hospital Associated Infection

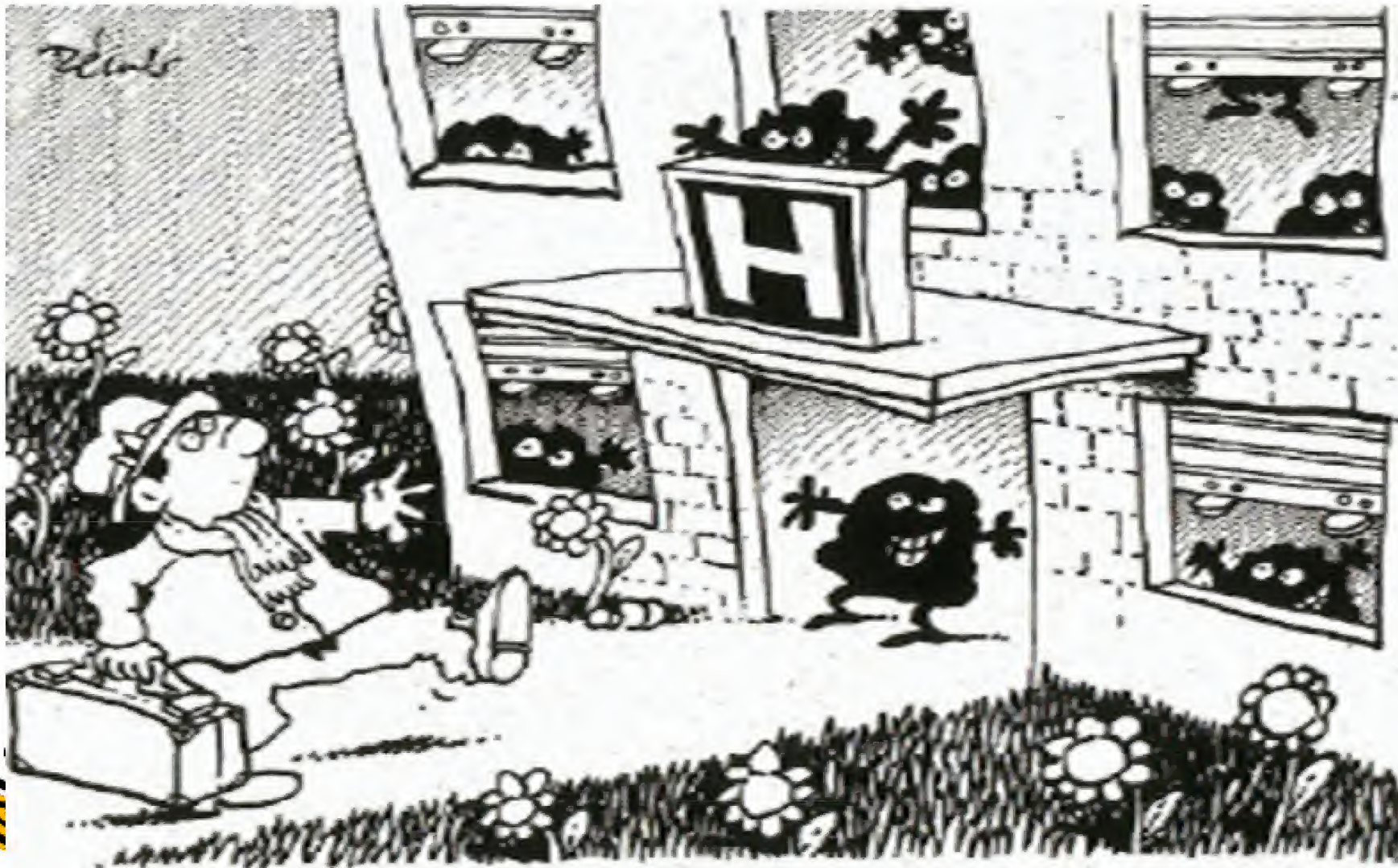
By

Dr. Suzan El-Fiky

*Professor Microbiology, Faculty of Medicine ,
Alexandria university*



Welcome to the hospital!
Bugs are waiting for you!!!



The Magnitude of the Problem

Healthcare-associated infections are *adverse patient events* that are known to affect the health and safety of approximately two million persons annually.





Definition of nosocomial infection

- Nosocomial” or “hospital acquired” infections are those which occur in hospitalized patients and which were not present or incubating at the time of admission .

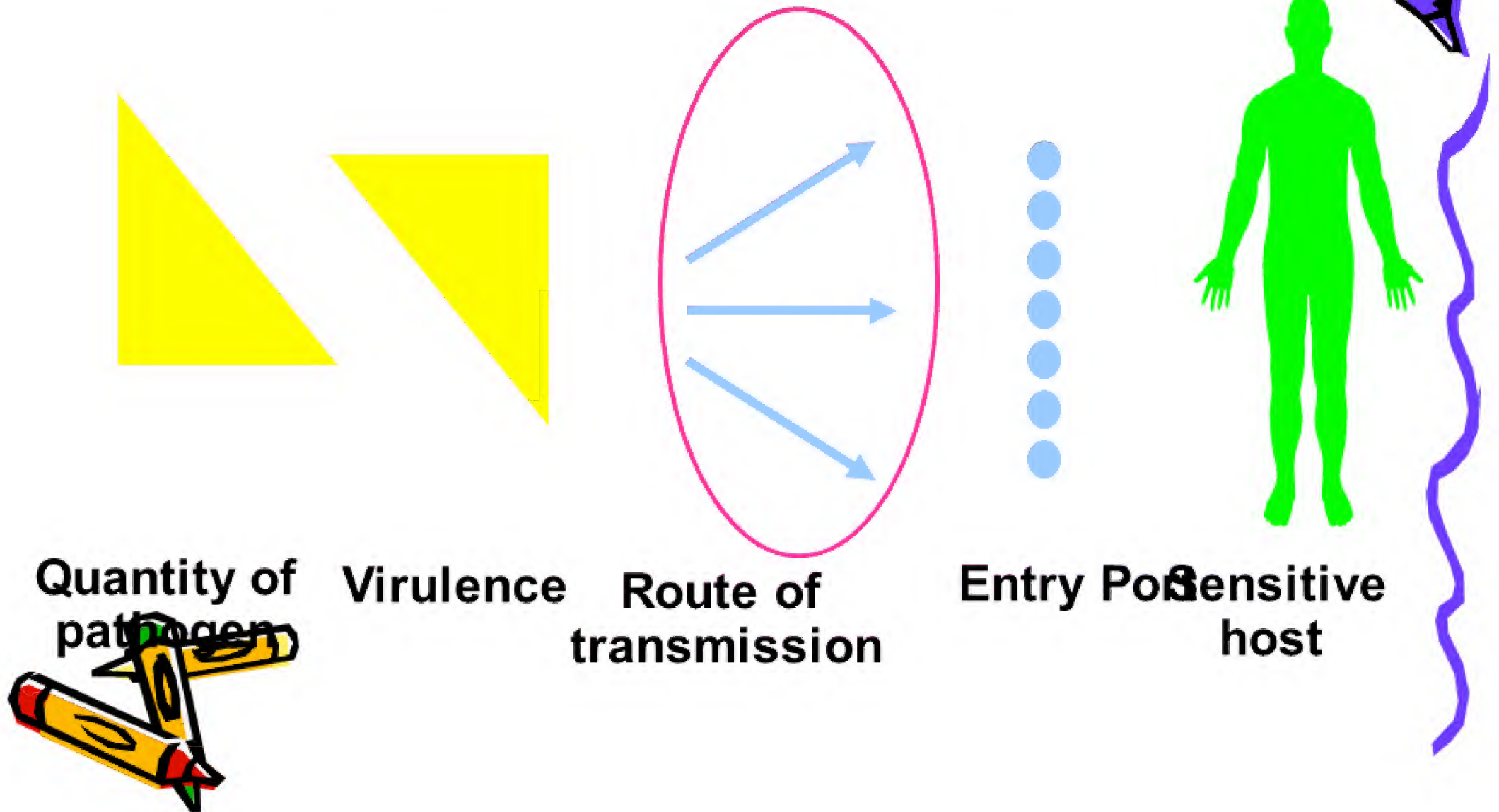


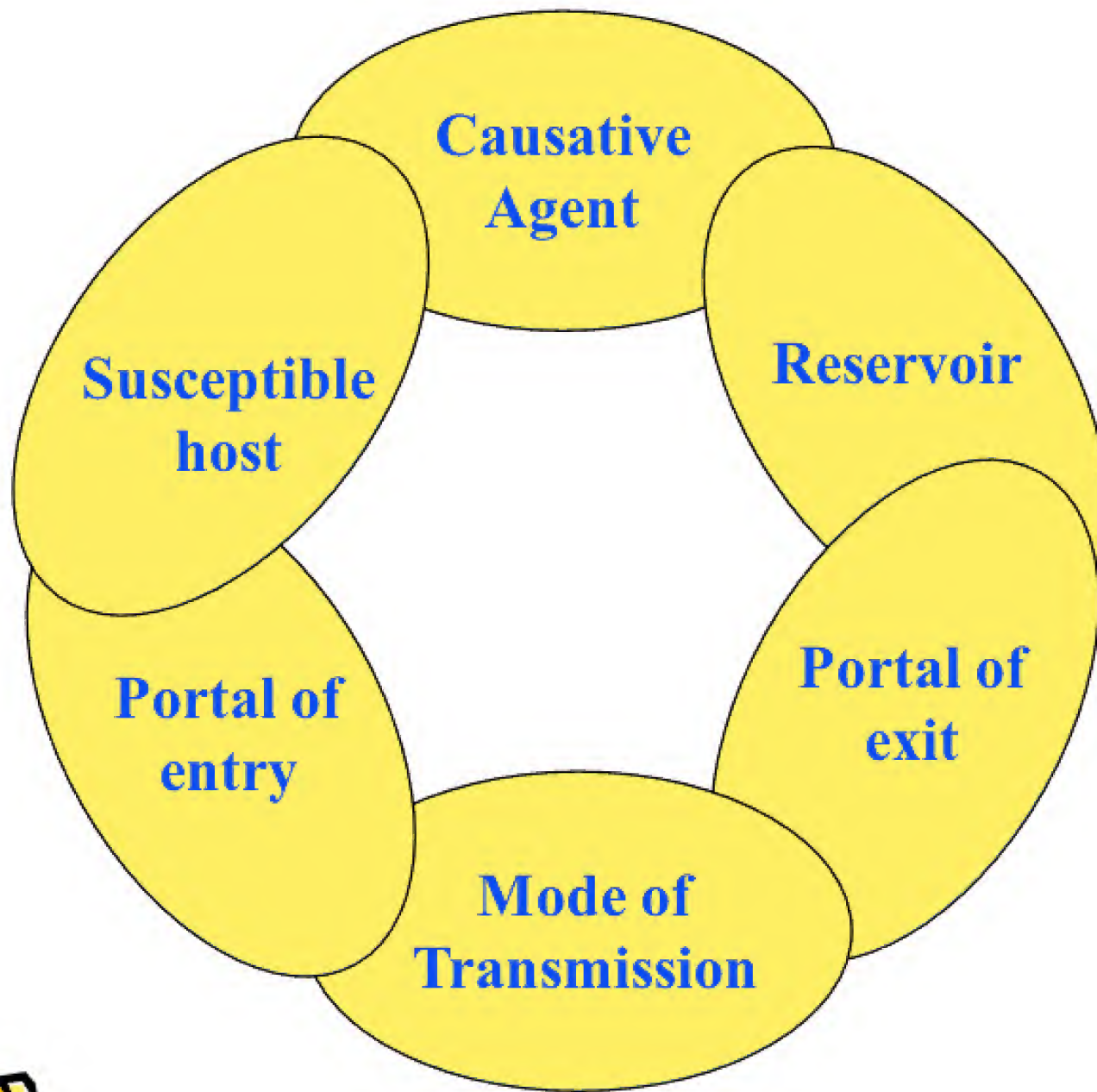
Nosocomial Infections

- Better called Healthcare Associated Infections (HAI)
- A localized or systemic conditions that result from adverse reaction to the presence of an infectious agent or its toxin
- Not present or incubating on admission to the hospital



Chain of Infection

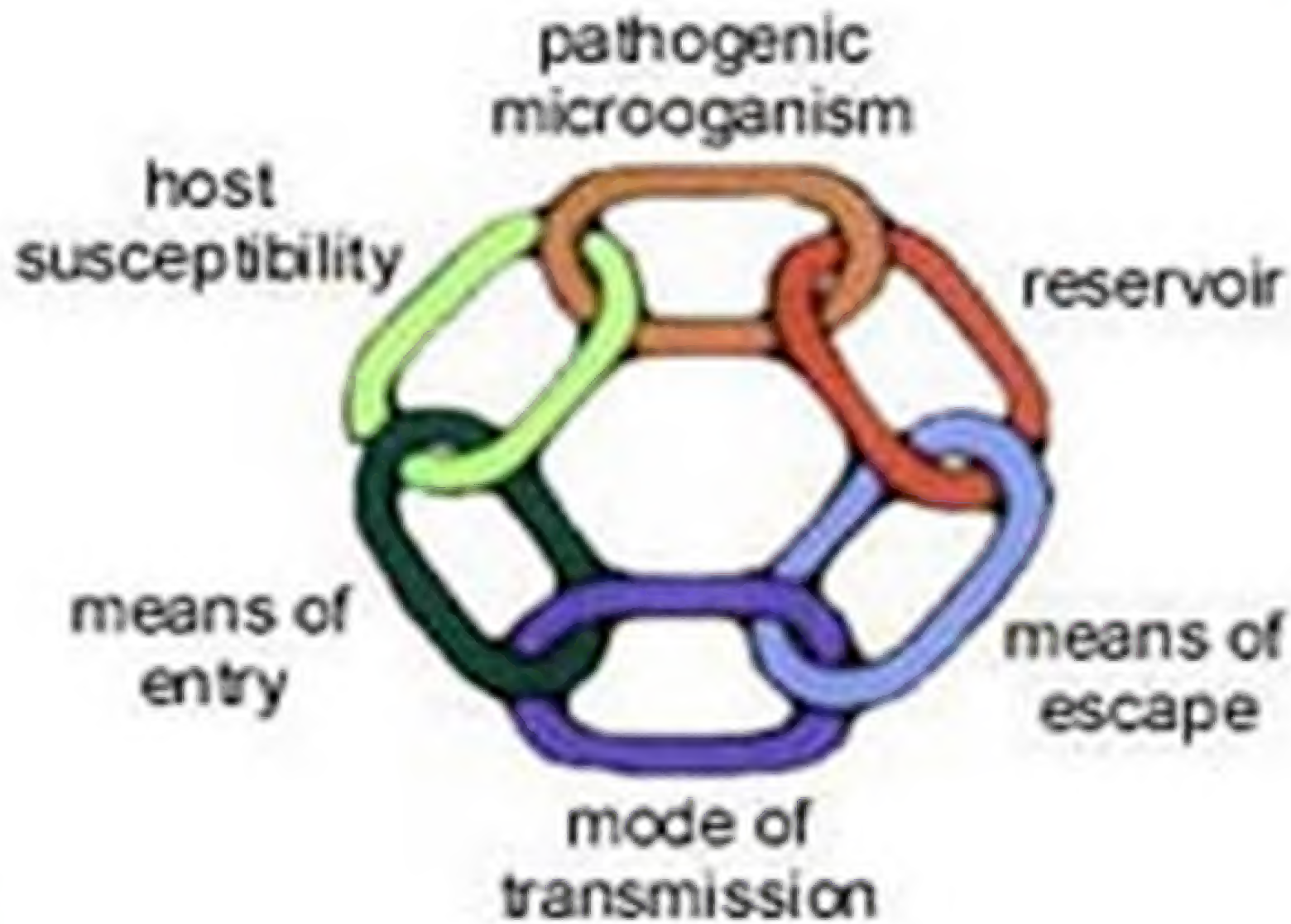




The Chain of Infection.

Components of the Infectious Disease Process.







There are many different **sources** of pathogens when in hospital

- Own normal flora (endogenous)
- Infected patients
- Traffic of staff and visitors
- Environment e.g. fungi, *Legionella*
- Blood products

Surgical instruments.



The sites of nosocomial infections

- Urinary tract(UTI).
- Surgical wounds (SSI).
- Respiratory tract (RTI).
- Skin (especially burns) -SST.
- Blood (bacteraemia) -BSI.
- Gastrointestinal tract. ***Clostridium difficile* Infection**



Central nervous system.



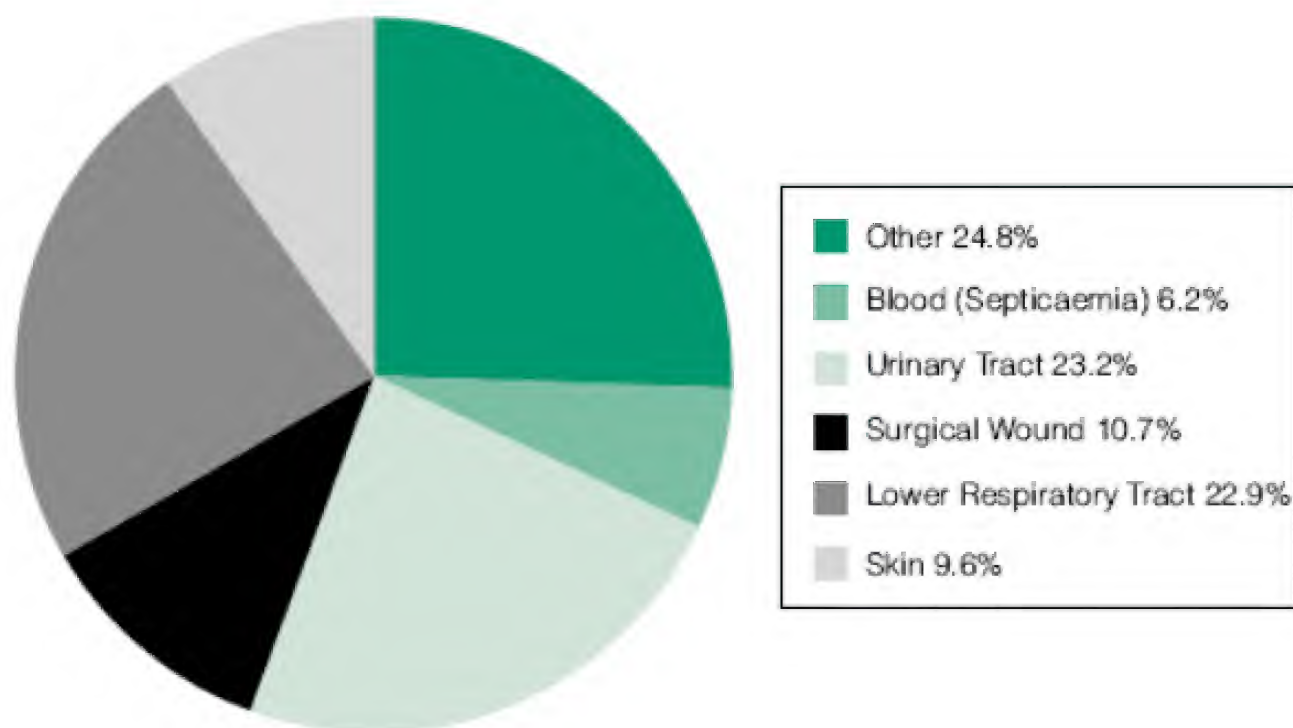


Around 9 per cent of patients have a hospital acquired infection at any one time

The main sites of hospital acquired infections

Figure 1

Urinary tract infections are the most common type of hospital acquired infection and blood stream infections have the highest associated mortality



Source: Second prevalence study Emmerson et al (1996)

Note: 37,111 patients from 15 centres were studied over a 15 month period from May 1993 to July 1994 in two month study periods and a mean hospital acquired infection prevalence rate of 9% (range 2-29%) was calculated.¹



A close-up photograph of a bouquet of white daisies with bright yellow centers. The flowers are arranged in a dense cluster, filling most of the frame. The background is a solid, dark blue color. Overlaid on the center of the image is the text "Impact of nosocomial infection." in a large, blue, stylized font with a red outline and a drop shadow effect.

Impact of nosocomial infection.

Impact of nosocomial infections

- *Increase morbidity & mortality.*
- *Coast effectiveness.*
- *Increase hospital stay.*
- *Emergence of resistant strains.*



Nosocomial infections are the result of three factors ;

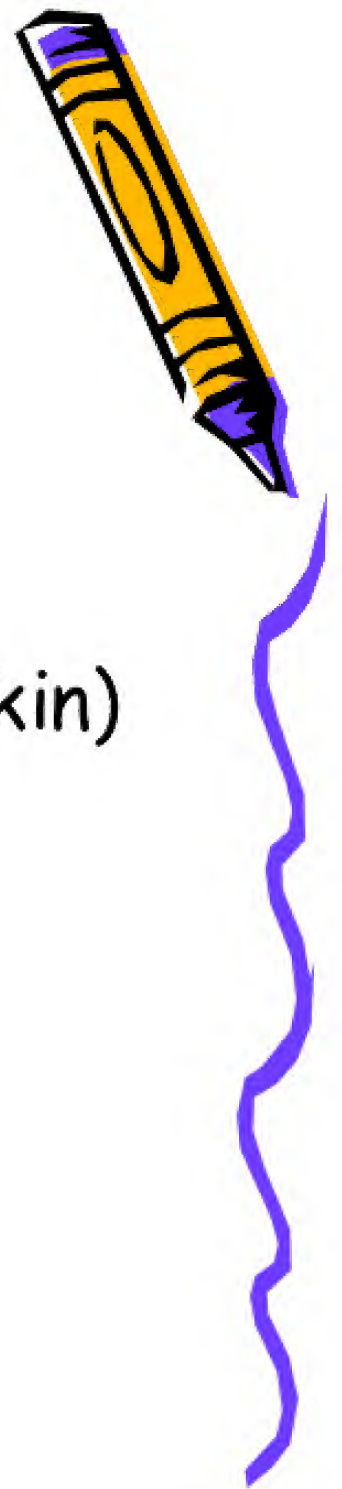
- 1. High prevalence of pathogens .*
- 2. High prevalence of compromised hosts .*
- 3. Efficient mechanisms of transmission from patient to patient.*



MRSA

- Methicillin (Meticillin) Resistant *Staphylococcus aureus*
- *S.aureus* carried by 30% of us (nose/ skin)
- MRSA is no more virulent than MSSA strains but more difficult to treat
- Emerging Vancomycin resistance is a concern

• *The Biomedical Scientist Jan 2008 p39-41*



Rapid MRSA screening

- Current methods for screening for MRSA are based on culture and take 48 hours
- PCR-based screening can generate a result in 2 hours!
- *mecA* is carried on a transferable gene cassette called *SCCmec* – but also found in coagulase-negative staphylococci
- PCR developed using primers for *SCCmec* and *orfX* on the *S. aureus* chromosome



A close-up photograph of a plant with dark red, serrated leaves. The edges of the leaves are variegated with a bright yellow-green color, creating a striking contrast. The leaves are densely packed and overlap each other. The text "Routes of pathogen transmission" is overlaid in the center in a white, sans-serif font.

Routes of pathogen transmission



- Nosocomial infections can be transmitted by all modes of transmission that occur in the community.



- Contact.
- Droplet.
- Air borne.
- Vector borne (no significant role in nosocomial infection).



Contact transmission

Skin to skin.

Patient to patient .

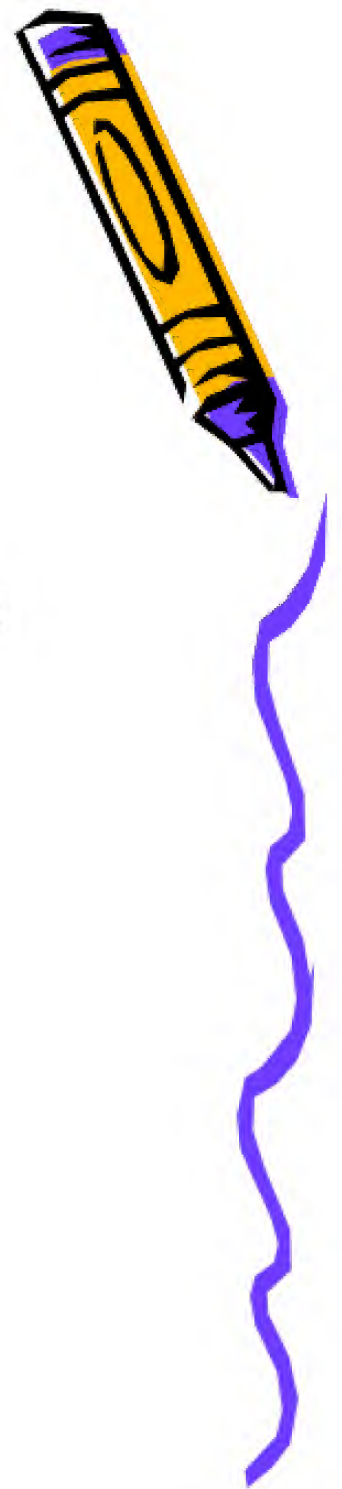
Patient to staff.

Patient to contaminated equipment.



Diseases transmitted by contact

- MRSA.
- Multiresistant gram negative bacteria (*Pseudomonas* & *E.coli*.)
- Scabies.
- *C.difficile*.
- Gas gangrene.
- *Bacillus anthracis* (Anthrax) .



Droplet transmission

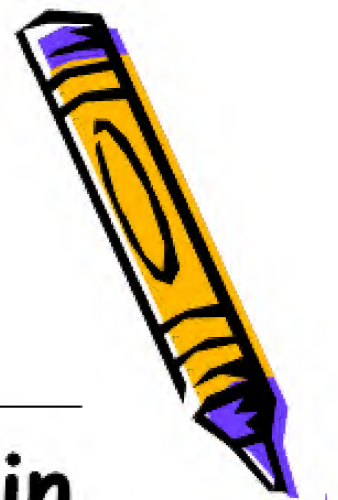
Droplets are generated from the source persons during:-

- Coughing.
- Sneezing.
- Talking.
- Performance of certain procedure
 - Suctioning.
 - Bronchoscope.
- The droplet size $>5 \mu\text{m}$ it involves contact with
 - Conjunctiva.
 - mm-of nose or mouth .



Droplet transmission

- Because the droplet do not remain suspended in air special air handling and ventilation are not required to prevent droplet transmission .



Diseases transmitted by Droplet

- Meningococcal meningitis.
- Influenza virus.
- Diphtheria.



Airborne transmission

- Air-borne droplet nuclei (5 μm) or smaller of evaporated droplet, that may remain suspended in the air for long periods.
- Air handling unit is required.
- Dust particles containing the infectious agents.



Disease transmitted by Air borne

- T.B.
- SARS.
- Chicken pox.
- Small pox.
- Measles



Standard precaution

- ❖ There precaution designed for the cause of all patients in hospital *regardless of their diagnosis (presumed infection status)*
- ❖ Standard precaution is the primary strategy for success of nosocomial infection control.



Bacteria carried by hands

- Transient microorganisms.
- Resident microorganism.



Transient microorganisms






- ❖ Not part of the normal flora .
- ❖ Represent recent contaminations .
- ❖ Survive only for a limited period of time.



Transient microorganisms;

- They are acquired during contact with the infected colonized patient or the environment and are easily removed by a good hand washing technique.



- 
- 
- The transient flora include most of the organism responsible for cross-infection e.g. gram negative bacilli(E.coli, klebsiella pseudomonas spp. ,and salmonella spp) Staph. aureus & viruses e.g Rota viruses.
- 

Resident flora

- These microorganisms are normal flora of the skin and include coagulase-negative Staphylococci (mainly staph. Epidermidis).
- They are usually deep seated in the epidermis and are not easily removed by a single hand washing procedure.
- They rarely cause infection apart from during implant surgery and at I.V site.



Occasions for hand washing

- Before & after pt. contact.
- Before & after gloving .
- After contact with pt. body fluids.
- After moving from contaminated body site to clean area.



Types of medical waste;

- Infectious waste.
- Sharp waste.
- Human part waste.
- Chemical waste.
- Cytotoxic waste.
- Pressurized containers.
- Radioactive waste.
- Pharmaceutical waste.



● تصنيف الألوان المعتمدة في النفايات

● Color Coding for Medical Waste Bags & Containers



النفايات العامة

Unregulated
Medical Waste



النفايات المعدية
Infectious Waste



النفايات الملوثة
بمواد سامة للخلايا

Cytotoxic Waste



SAFE HANDLING OF SHARP INSTRUMENTS

- needles,
- Scalpels,
- Broken glass or
- Other item that may cause a laceration or puncture.



SAFE HANDLING OF SHARP INSTRUMENTS

- ***Never recap.***
- ***Scoop method.***

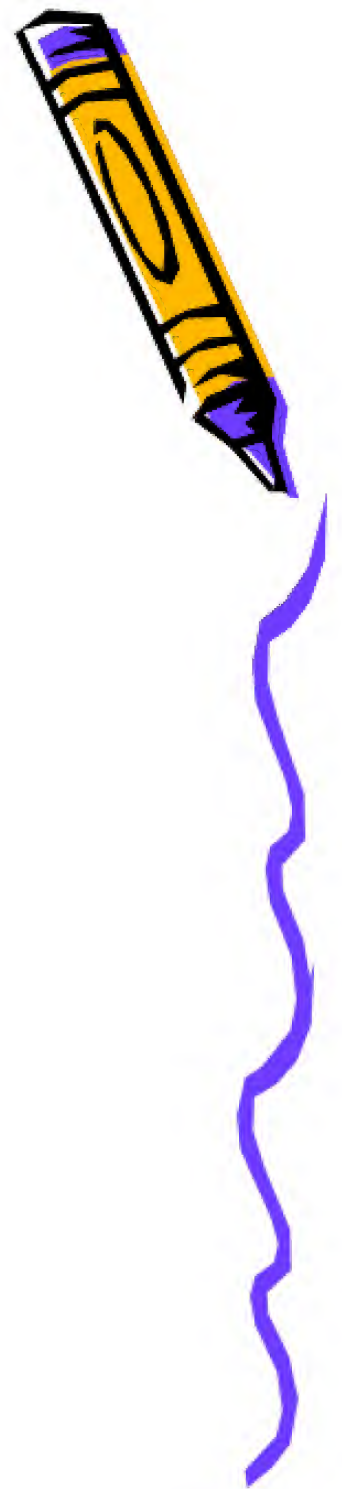




Biological spill kit



Preventing nosocomial infections



Methods of prevention of nosocomial infection (and breaking the chain of transmission) include;

1. Observance of aseptic technique
2. Frequent hand washing especially between patients
3. Careful handling, cleaning, and disinfection of fomites.




4. Where possible use of single-use disposable items .

5. patient isolation .

6. Avoidance where possible of medical procedures that can lead with high probability to *nosocomial infection*.





7. Various institutional methods such as air filtration within the hospital.

8. General awareness that prevention of nosocomial infection requires constant personal surveillance.

9. Active oversight within the hospital.



- Control of infections is everyone's personal responsibility.

